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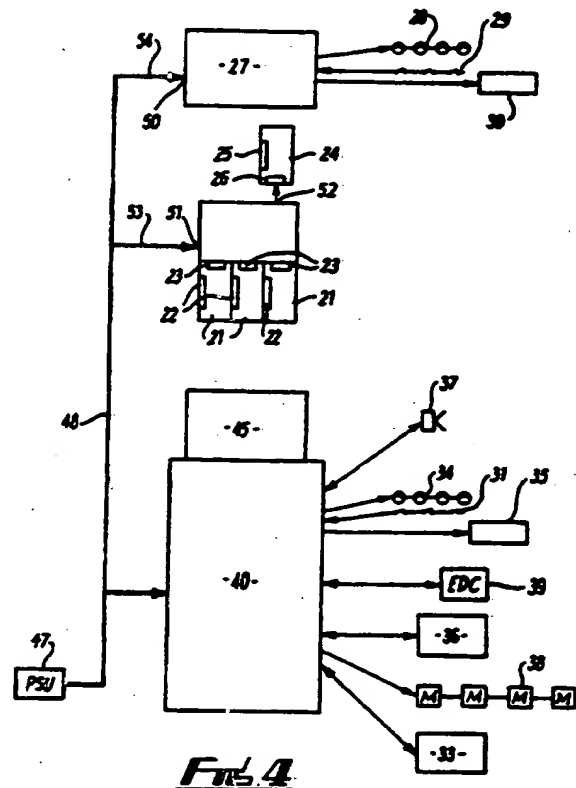
(56) Documents Cited
GB 2300062 A GB 2290847 A GB 2117155 A
WO 96/21974 A1

(58) Field of Search
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(54) Abstract Title

Entertainment machine including a serial bus

(57) An entertainment machine, such as a fruit machine, has a main control unit 40 and peripheral devices such as lamp unit 27, stepper motors 22 and lamps 23 for main reels 21, and stepper motor 25 and lamp 26 for a feature reel 24, all mounted at different locations within a machine cabinet (1, fig 2), the control unit being linked to the peripheral devices by cabling which includes at least one serial bus 48 which connects with addressable interface devices 50,51 to which the peripheral devices are connected. All of the peripheral devices may be linked by the serial bus, which may have a closed loop arrangement.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

FIG. 1

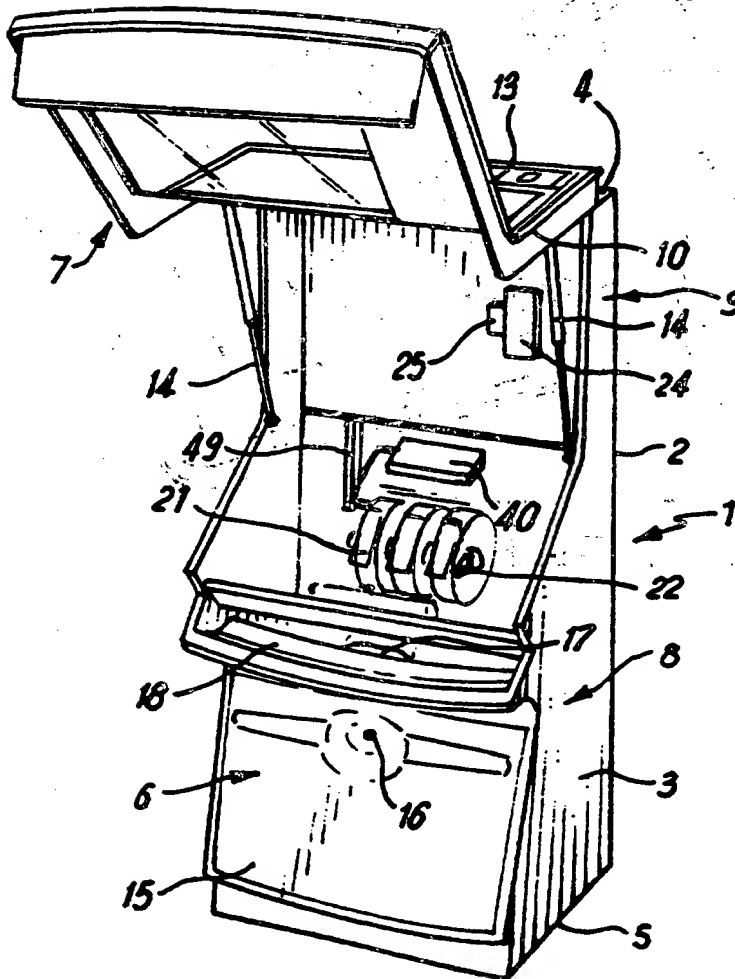
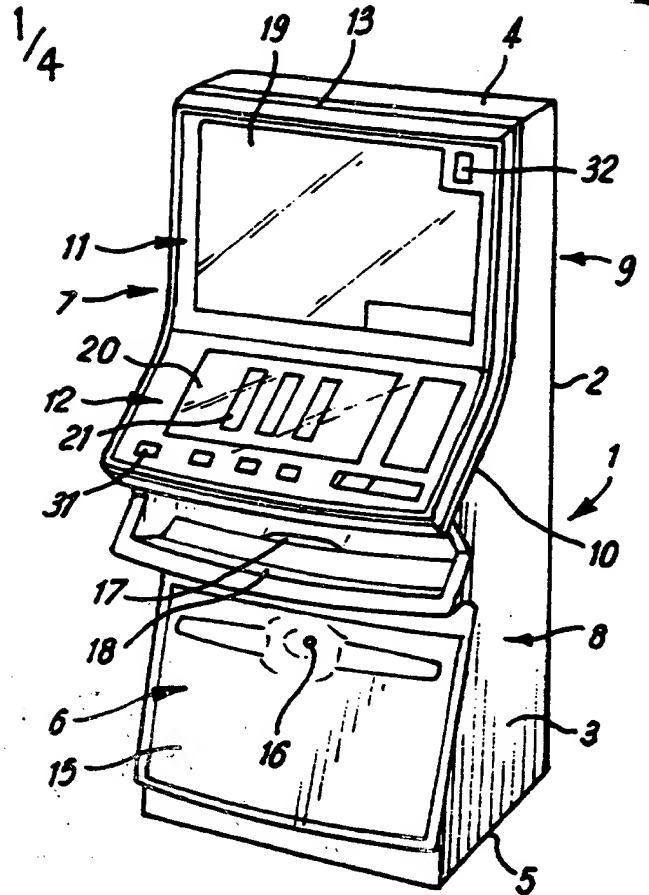


FIG. 2

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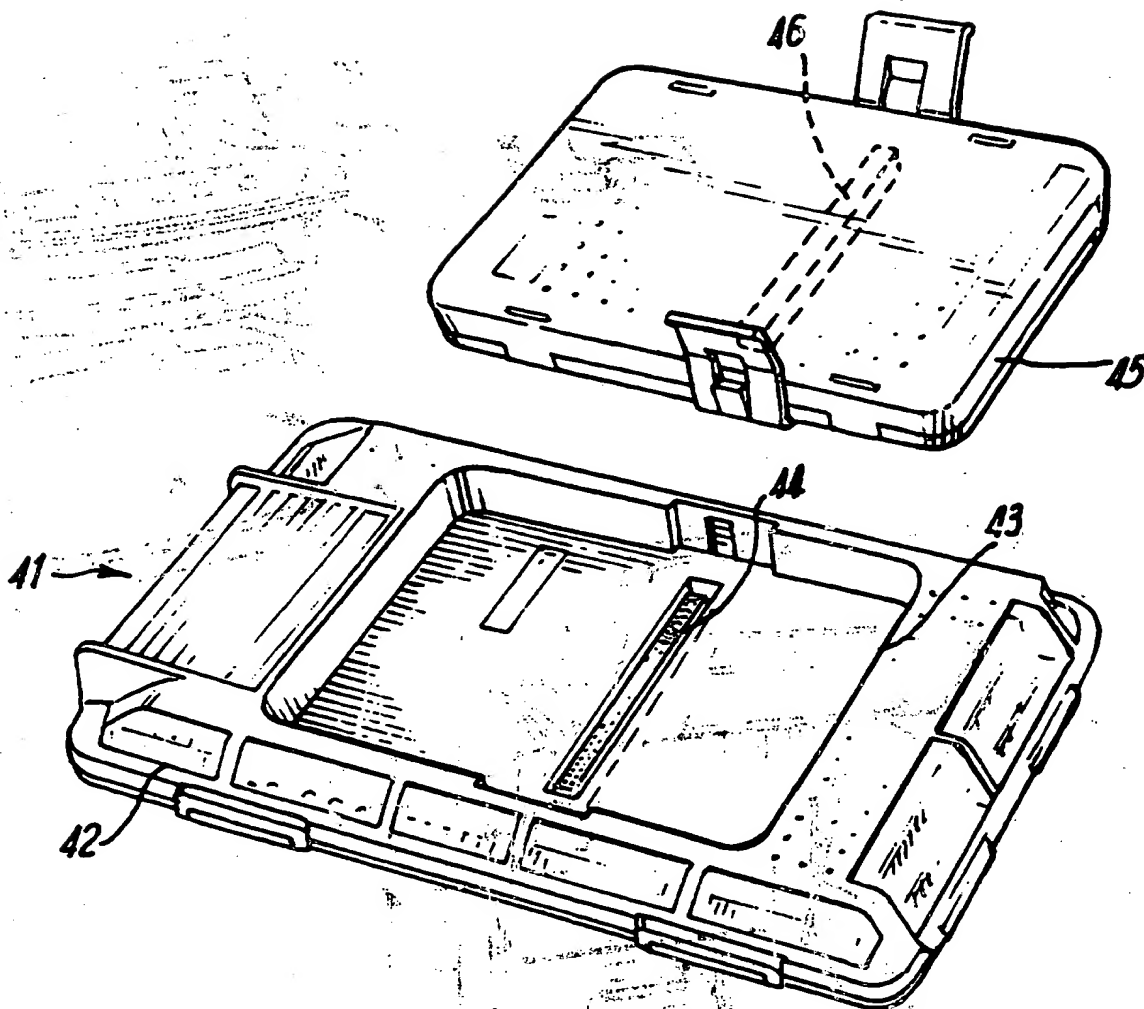


FIG. 3

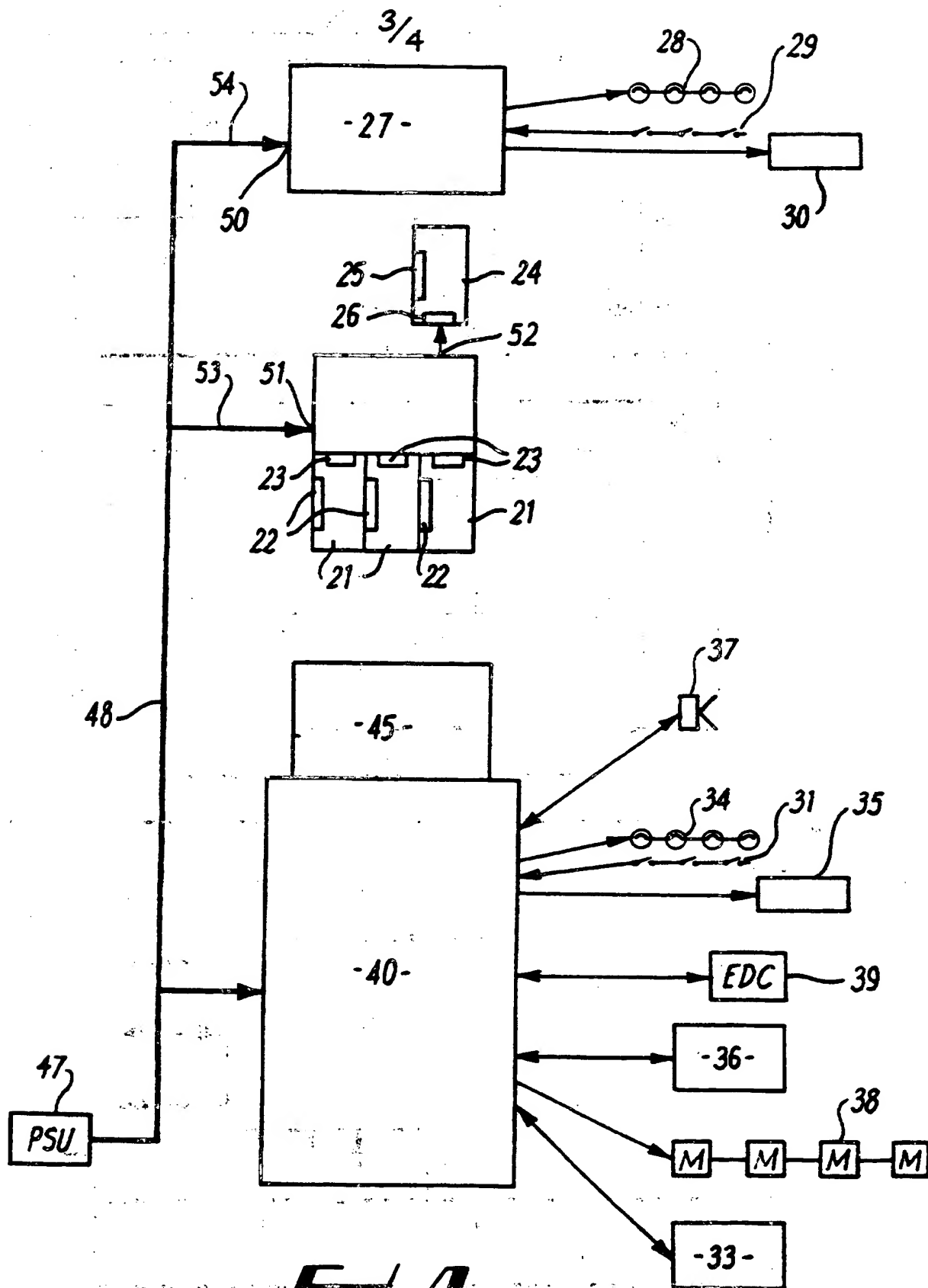


Fig. 4

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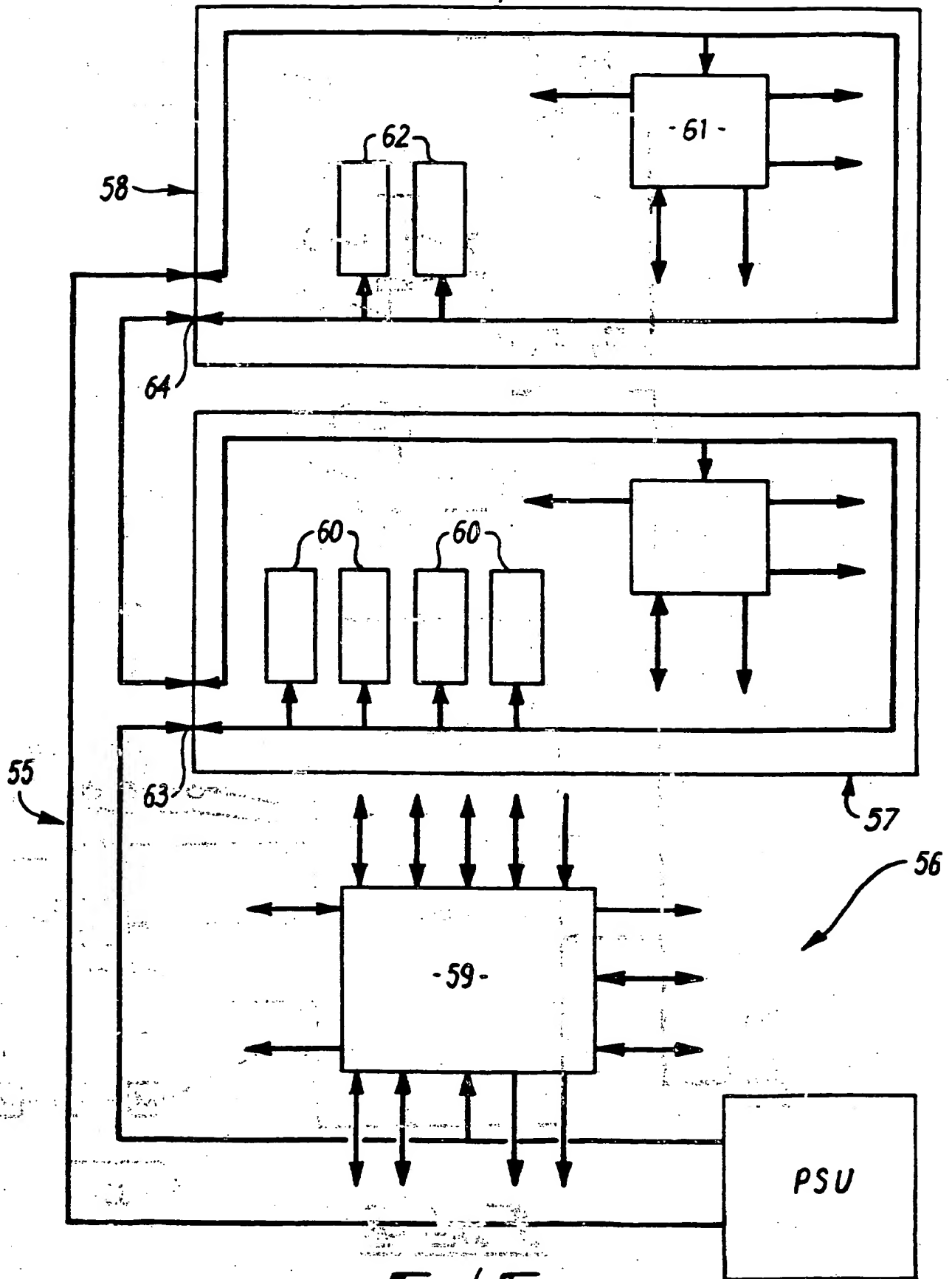


Fig. 5

ENTERTAINMENT MACHINES

This invention relates to entertainment machines.

The invention is particularly, although not exclusively, concerned with player-operable entertainment machines, especially coin-operated amusement machines. As used herein the term coin is intended to cover
5 tokens, charge or credit cards or any other means of supplying credit or monetary value.

Coin-operated amusement machines of the "fruit" or "poker" kind have a main display device for displaying a selected combination of symbols at
10 a win zone. In the event that a predetermined winning combination is attained, an award such as a pay out of coins, may be made available to the player.

This main display device may comprise an assembly of side-by-side rotatable symbol-bearing reels, or a video representation of this.
15 Additionally it is common for there to be a secondary 'feature' game display comprising a ladder or track along which play can progress by successive back illumination of printed areas on a front glass panel. Progression in the feature game may occur in correspondence with a secondary selector which may also comprise a rotatable symbol-bearing reel.

20 Modern fruit or poker machines have control systems which use microprocessor based circuitry. Typically, a main control unit containing the circuitry is linked via interface devices within the unit directly by cabling to

the respective peripheral devices, such as the above mentioned symbol-bearing reels of the main display device, back-illumination lamps of the feature game display, the reel of the secondary selector, and also a coin mechanism, a payout mechanism, player push buttons, additional display lamps, and internal operation monitoring and data storage devices.

With this arrangement it will be appreciated that considerable cabling is required which is inconvenient and expensive to install and service.

Moreover, this known arrangement adds to the cost and complexity of standardisation of machine manufacture. In this respect, new fruit or poker machines are regularly introduced and it is common practice to use a standardised control system. Different machine models have different game software which can be accommodated by used of differently programmed memory chips or units inserted into a standardised mother-board of the main control unit. However, different machine models may also require different positioning or types of peripheral devices and this may require changes in cabling, and/or use of multiple cables of which only some are used in a particular machine leaving other redundant.

An object of the present invention is to provide a control system using cabling of improved versatility and ease of installation and maintenance.

According to the invention therefore there is provided an entertainment machine having a machine cabinet housing a control system

and multiple peripheral devices mounted at different locations within the cabinet, said control system comprising a main control unit and cabling linking said unit with said peripheral devices, characterised in that the cabling comprises at least one serial bus which connects with addressable
5 interface devices to which the peripheral devices are connected.

With this arrangement, it is possible to convey switching or other signals between the control unit and the peripheral devices along one or a small number of common serial buses whereby installation and maintenance of the control system can be facilitated, and in particular only a relatively
10 small number of cables need be required. Moreover, in so far as distribution of control signals can be controlled by software in the control unit, versatility can be much improved in that at least some, and possibly all changes to machine operation or design can be accommodated by software changes without requiring rewiring.

15 The control system of the invention may be used with any suitable kind or construction of entertainment machine. Most preferably, however, the machine has a cabinet with a main body part and a front wall structure comprising a mounted display panel with at least one said peripheral device associated therewith, which front wall structure can be moved relative to
20 the said body part to open the cabinet for access to the interior thereof, whereby the (or at least one) said serial bus extends within the cabinet between the control unit mounted in the body part and the (or each) said

peripheral device associated with the said display panel.

With this arrangement, the control system of the invention can be particularly advantageous. It is common practice to associate multiple peripheral devices with front panels of entertainment machines and the
5 minimised cabling arrangement of the invention facilitates installation in this context.

Most preferably the said body part of the machine cabinet comprises an upright, floor-standing structure.

Preferably also the body part has a base part which is closed, or
10 closable, separately from the opening front wall structure, and the opening front wall structure is mounted on an upstanding top rear structure.

The said base part may have a lockable access door thereto. The control unit of the control system may be mounted within the base part.

The front wall structure may be movably mounted via a hinge joint or
15 the like and gas or hydraulic struts, or detachable fixed struts or the like may be provided to hold the wall structure temporarily in its open position.

In a particularly preferred embodiment the front wall structure is mounted so that it hinges upwardly at a top edge thereof.

The front wall structure may incorporate a single said panel, or
20 multiple panels e.g. two panels one above the other if desired at an angle to each other whereby the bottom panel projects forwardly.

The cabinet may be a single housing structure. Alternatively it may

comprises multiple separate or separable housing structures.

5 With regard to the peripheral devices these may be any one or more of electrical devices such as are commonly used in entertainment machines such as lamps, motors, VDU displays, LED or LCD displays, player controls such as press buttons, coin mechanisms, pay out mechanisms, sensor devices for monitoring machine operation or status, data storage and retrieval systems, alarm systems, etc.

10 The arrangement may be such that all peripheral devices are linked by one or more said serial buses. Alternatively, one or more peripheral devices may be linked using conventional direct cabling. In one embodiment main display reels, and a bank of lamps are linked by one or more buses and all or most other devices are direct-linked.

15 With regard to the addressable interface devices these may comprise intelligent circuitry such as microprocessor-based circuitry and these may be mounted on or closely adjacent the respective peripheral devices.

20 The bus arrangement may be such that there is a single serial data bus linking the control unit to the (or each) peripheral device in conjunction with a power supply bus whereby the data bus controls switching connection of the power supply bus to the respective peripheral device. A closed loop arrangement for the data bus and/or the power supply bus may be used.

The (or each) bus may comprise an integral run. Alternatively it may

comprise multiple runs linked by connectors.

It is visualised that the invention will find particular application in the context of a coin-operated amusement machine, especially a fruit machine using actual (or simulated) rotatable reels.

5 The invention will now be described further by way of example only and with reference to the accompanying drawings in which:-

Figs. 1 & 2 are diagrammatic perspective views of one form of an entertainment machine according to the invention respectively with a front wall structure thereof in closed and open
10 conditions;

Fig. 3 is a diagrammatic perspective view of one form of a control unit of a control system used in the machine of Figs. 1 & 2; and

Figs. 4 & 5 are block circuit diagrams of alternative embodiments of
15 control systems.

Fig. 1 shows a fruit machine having an upright floor-standing cabinet 1. The cabinet 1 has a generally planar rear wall 2, two like shaped side walls 3, top and bottom planar end walls 4, 5, a lower front wall 6, and an upper front wall structure 7.

20 As can be seen, the side walls 3 and the front wall structure 7 are stepped so that the cabinet 1 has a generally rectangular base part 8 which joins with a narrower upstanding top part 9.

The front wall structure 7 has a metal frame 10 supporting upper and lower flat glass panels 11, 12, the upper panel 11 being generally upright (in the closed condition) and the lower panel being inclined forwards.

5 The frame 10 is hinged at its top edge 13 to the top wall 4 and there are gas struts 14 (Fig. 2) between the sides of the frame 10 and the adjacent side walls 3 of the cabinet 1. The front wall structure 7 can be hinged between the closed position of Fig. 1 and the open position of Fig. 2. The gas struts 14 acts to hold the front wall structure 7 in the open position.

10 The front wall 6 of the base part 8 contains a door 15 which can be opened releasing a key lock 16. Above this door 15 there is a payout outlet opening 17 leading to a transverse coin tray 18.

The two glass panels 11, 12 are printed to define window areas 19, 20 and adjacent decoration and information.

15 Within the cabinet 1 at the top of the base part 8, there are mounted three horizontally axially aligned reels 21 having say 20 symbols at regularly spaced intervals around their peripheries. The reels 21 are axially rotatable and are drivably connected to respective stepper motors 22. The reels 21 are arranged behind the window 20 in the lower glass panel 12. Each reel
20 21 can be arrested by the respective stepper motor 22 in any of 20 stopping positions in which one symbol is in precise registration with a horizontal win line in the centre of the window, and two further symbols are

visible above and below the win line. Lamps 23 are provided in the reels 21 for back illumination purposes.

Within the cabinet 1, in the upper part 9, there is a single selector reel 24 drivably connected to a stepper motor 25 and having symbols on its outer periphery, the reel 24 being mounted behind the upper glass panel 11 so that, when the reel is stopped, one symbol can be seen through the window 19. This reel 24 is provided with a back illumination lamp 26.

Also in the upper part 9 of the cabinet 1 behind the upper panel 11 there is mounted a display unit 27 comprising a bank of lamps 28, behind a printed track of a feature game. The bank of lamps 28 is fixed between the side walls 3. These lamps 28 are arranged in a matrix in conjunction with a set of switches 29 whereby a desired number and distribution of lamps 28 can be selected for use by setting the switches 29. Also, the unit 27 has an alphanumeric (LED) display 30 which is positioned to be seen through the panel 11.

Further, at the bottom of the front frame structure 7, there are user press buttons 31, at the top there is a slot 32 leading to an internally mounted coin mechanism 33, there are further lamps 34 behind the press buttons 31 and behind display areas of the panel 12, and there is a further alphanumeric LED display 35 behind the window in the panel 12, all such components 27-35 being separate from (or having internal parts separable from) the front wall structure 7 to permit opening of this.

In the base part 8 there is a payout mechanism 36 leading to the outlet 17, a sound system 37, various machine status monitoring and data capture devices such as meters 38, data stores 39, etc. and also a main control unit 40.

5 There may also be other electrical devices as required, such as a note acceptor.

10 The main control unit 40 is shown in Fig. 3 and comprises a plastics tray-shaped housing 41 containing microprocessor control circuitry on a mother board. At the edges of the housing 41 there are various connectors 42. In the centre of the housing there is a central well 43 containing a single female connector 44. Within the well, a programme unit in the form of a case circuit board 45 is a removable snap fit with a male connector 46 engaged with the female connector 44. This unit 45 has plug-in EPROM (or other non-volatile memory) chips containing programme information.

15 As shown in the block circuit diagram of Fig. 4, the various peripheral electrical devices 27-39 mentioned above are connected to the main control unit 40 for control purposes. A power supply unit 47 is connected to or incorporated in the control unit 40 to provide a suitable system power supply derived from mains supply.

20 In most cases the devices 27-39 are connected directly to the control unit 40, as is the case with the following devices: the sound system 37, the supplementary lamps 34, the push buttons 31, the lower panel

alphanumeric display 35, the coin mechanism 33, the payout mechanism 36, the meters 38 and data capture devices 39. That is these devices are connected to the control unit by cable links which run individually between the devices and respective connectors 42 on the unit 40. Signals or switching impulses are fed to or received from the unit 40, and/or power from the power supply unit 47 is channelled to these devices, as appropriate. The unit 40 incorporates peripheral interface devices, power switches and the like for interface purposes.

The unit 27, which incorporates the matrix of lamps 28, the alphanumeric display 30, and the switches 29, and also the stepper motors 22 and associated lamps 23 for the main reels 21, and the stepper motor 25 and lamps 26 for the feature reel 24, are connected to the control unit 40 by a power and serial data bus 48. That is, there is a single run of cabling 49 (Fig. 2) between the control unit 40 and each of these devices 27, 22, 23, 25, 26 containing sufficient leads to provide unique serial data address information and to carry operating power and data signals.

Typically there may be say 11 conductor cabling 49 and this may carry 8 bit address information and one or a number of different voltage level power leads.

At the destination devices, i.e. the unit 27, and the electric devices 22, 23, 25, 26 of the reels 21, 24 the cabling 49 is connected via a respective addressable switching device 50, 51, 52 using microprocessor

circuitry to drive devices for the respective lamps 23, 26 reels motors 22, 25 and any other associated electrics. Power is supplied to these devices from the cabling 49 when the local microprocessor circuitry is activated by appropriate address data, which corresponds to that particular destination device, carried by the cabling 49.

As can be see from Fig. 2, there is a single run of the cabling 49 from the control unit 40 with a branch 53 to the nearby reels 21, and from there up one back corner of the cabinet 1 to the feature unit 27, with a cabling branch 54 to the feature reel 24.

When the fruit machine, is powered up various lamps 22, 25, 28 are illuminated to give a static, or change 'attract' display. This is effected by the control unit 40 under the control of the program in the program unit 45. Power is fed to the lamps 22, 25 in the reels and in the bank of lamps 28 via the cabling 49. Appropriate address information is transmitted along the cabling 49 together with instructional data to activate the microprocessor circuitry 51, 52 of the respective reel 21, 24 or feature unit 27 as and when a change in the activation of the respective lamps 22, 25, 28 is required. That is, for example, address data corresponding to the unit 27 is transmitted along the cabling 49 to activate the lamps 28, and data signals are received by the microprocessor circuitry 50 via the cabling 49 to instruct such circuitry 50 as to which pattern of the operational lamps 28 is to be operated. These lamps 28 are then powered via their drive devices

from the appropriate power lines of the cabling 49. A changing pattern of lamp operation occurs in correspondence with changing instructional data signals received from the control unit 40.

5 In like manner, other functions are controlled via the cabling 49, such as rotation and stopping of the reels 21, 24 and activation of the alphanumeric display 29.

Other devices which are operational at this stage, such as the other lamps 34 and the other alphanumeric display 35 are controlled by the unit 40 via the direct cable links therebetween i.e. not via the serial bus 48.

10 When the fruit machine is operated by a player, the player first has to insert coins into the coin mechanism 33 through the slot 22 in order to generate credit for one or more games, whereby the machine is actuated, by direct cable link between the coin mechanism 33 and the control unit 40, so that a game can now be played. The game commences after a start
15 button 31 has been pressed and the reels 21 spin and then come to rest so as to display a combination of symbols on the win line of the window 20 in correspondence with random or pseudo random selection of such combination in the software of the control unit 40. The selected combination is assessed and a win indication or payout, using the payout
20 mechanism 36, may be actuated.

In accordance with conventional practice, the player may be given the opportunity of intervention in symbol selection at the start or end of a game

as for example by activating 'hold' or 'nudge' buttons 31, or by 'gambling' a win using a 'stop' button 31 in relation to 'movement' of illuminated lamps 28 or 34 up and down a ladder printed on one of the panels 11 or 12. Also, in dependence on the selected symbols, or otherwise, play may automatically transfer or be transferred at the option of the player, to a 'feature' game on the upper panel 11 whereby play progresses around a printed track as represented by 'movement' of illuminated track sections using the lamps 28, in correspondence with numbers, or other symbols, selected by the software and represented by display on the feature reel 24.

This course of play is controlled by the control unit 40 which controls transmission of signals between, and feeds power to, the respective peripheral devices as required, this being effected in the case of the unit 27 and the reels 21, 24 via the cabling run 49 incorporating the serial bus, and in the case of the other devices by direct cable links without serial bus.

The front opening construction of the cabinet 1 provides a convenient means of access to the interior of the cabinet for installation and maintenance purposes. The use of the cabling 49 incorporating the power supply and serial bus 48 facilitates such installation and maintenance and can readily accommodate different types and locations of peripheral devices such as may be required for different machine models. In particular, widely differing machine models can be readily manufactured using a standardised control system installation.

It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which are described by way of example only.

In particular, it is to be understood that layout of the cabling 49 may
5 differ from that described and may be used with different peripheral devices, and also be used with a different cabinet construction. By way of example, the cabling 49 may constitute a closed loop which runs from the control unit 40 around the machine and back to the control unit 40, peripheral devices being connected to the loop at any convenient position by virtue of
10 branches, like the branch 53, 54. Also, the cabling 49 need not be an integral run but may comprise interconnected (e.g. plug-in runs) so that the cabling 49 can be extended as and when required and/or can be installed in multi-part cabinets whereby separate cabinet parts have separate cabling runs which are linked together when the cabinet parts are assembled.

15 As an illustration, Fig. 5 shows a closed loop 55 running between separate cabinet parts 56, 57, 58 of a fruit machine, namely a base part 56 containing the control unit 59 with coin handling mechanisms, an intermediate part 57 on top of the base part 56 containing the main reels
20 60, and a top part 58 on top of the intermediate part 57 containing the feature unit 61 and the feature reel 62.

The loop 55 incorporates connectors 63, 64 at the interface with the intermediate part 57 and top part 58.

CLAIMS

1. An entertainment machine having a machine cabinet housing a control system and multiple peripheral devices mounted at different locations within the cabinet, said control systems comprising a main control unit and cabling linking said unit with said peripheral devices, characterised in that the cabling comprises at least one serial bus which connects with addressable interface devices to which the peripheral devices are connected.
2. An entertainment machine according to claim 1, wherein said cabinet has a main body part and a front wall structure comprising a mounted display panel with at least one peripheral device associated therewith, said front wall structure is moved relative to the said body part to open the cabinet for access to the interior thereof, whereby at least one serial bus extends within the cabinet between the control unit mounted in the body part and the said peripheral device(s) associated with the display panel.
3. An entertainment machine according to claim 2, wherein said body part comprises an upright, floor-standing structure.
4. An entertainment machine according to claim 2 or claim 3, wherein said body part has a base part which is closable and separate from the opening front wall structure, and said opening front wall structure is mounted on an upstanding top rear structure.
5. An entertainment machine according to claim 4, wherein said base

part has a lockable access door thereto.

6. An entertainment machine according to claim 4 or claim 5, wherein said control unit of said control system is mounted within said base part.

7. An entertainment machine according to claim 2 or any claim dependent thereon, wherein said front wall structure is movably mounted via a hinge joint, and struts are provided to hold said front wall structure temporarily in its open position.

8. An entertainment machine according to claim 2 or any claim dependent thereon, wherein said front wall structure is mounted so that it hinges upwardly at the top edge thereof.

9. An entertainment machine according to claim 2 or any claim dependent thereon, wherein said front wall structure incorporates a single panel.

10. An entertainment machine according to claim 2 or any one of claims 3 to 8 when dependent on claim 2, wherein said front wall structure incorporates at least two panels.

11. An entertainment machine according to any preceding claim, wherein said cabinet is a single housing.

12. An entertainment machine according to any one of claims 1 to 10, wherein said cabinet comprises multiple separate and separable housing structures.

13. An entertainment machine according to any proceeding claim, wherein all said peripheral devices are linked by said serial bus.

14. An entertainment machine according to any one of claims 1 to 12, wherein said peripheral devices linked by one said serial bus include a bank of lamps and main display reels, the other said peripheral devices being direct-linked via conventional cabling.

15. An entertainment machine according to any proceeding claim, wherein said addressable interface devices comprise intelligent circuitry which is microprocessor based.

16. An entertainment machine according to any proceeding claim, wherein there is a single serial data bus linking said control unit to said peripheral device(s) in conjunction with a power supply bus whereby said data bus controls switching connections of said power supply bus to said respective peripheral device.

17. An entertainment machine according to claim 16, wherein a closed loop arrangement is provided for said serial data bus.

18. An entertainment machine according to any proceeding claim, wherein a closed loop arrangement is provided for the power supply bus.

19. An entertainment machine according to any proceeding claim, wherein said bus comprises an integral run.

20. An entertainment machine according to any one of claims 1 to 18,

wherein said bus comprises multiple runs linked by connectors.

21. An entertainment machine according to any proceeding claim, which is a coin-operated fruit machine.

22. An entertainment machine substantially as herein before described with reference to and as illustrated in the accompanying drawings.



Application No: GB 9712898.7
Claims searched: 1-22

Examiner: Michael Logan
Date of search: 28 September 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): G4V (VAA, VBH)

Int Cl (Ed.6): G07F 17/32, 17/34

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2300062 A (BARCREST) see page 10, line 15 - page 11, line 11	1-11,13,15 16,19,21
X	GB 2290647 A (BALLY GAMING) see figs 1-4	1,11,15,21
X	GB 2117155 A (THOMAS et al) see page 2, lines 111-121	1,11,15,21
X	WO 96/21974 A1 (ARISTOCRAT) see page 1, lines 14-36	1,15

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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